CHAPTER 3.7
Public Utilities, Service Systems, and Energy

This Chapter examines the potential for the proposed Shasta River Watershed-wide Permitting Program (Program) to adversely affect public utilities, service systems, and energy generation and consumption, and identifies mitigation measures for those impacts determined to be potentially significant.

3.7.1 Setting

The Program is located entirely within the Shasta River watershed (Program Area) within Siskiyou County, California. As mentioned earlier in Chapter 3.1, the incorporated cities of Weed, Yreka, and Montague are not participating in the Program. The Shasta River Valley is served by several public utilities and service systems, described below.

Water

The Program Area consists of rural agricultural landscapes and forested uplands. Residential and commercial developments are scattered and of low density throughout the agricultural areas, and are even more sparse in the forested areas. Much of the high country in the mountains to the north, east and south of Shasta Valley are federally-designated wilderness areas. Water for irrigation is from two primary sources: surface water diversions and groundwater (see Chapter 3.1).[1] Most surface water diversions use a system of seasonal checkdams, headgates, and ditches to convey water by gravity from the stream of origin to the point of use. Although many individual farmers own and operate individual irrigation systems within Shasta Valley, several large water user associations operate in the area. These water user associations operate and manage large irrigation water systems that share the costs of maintaining and operating the system, and provide an allocation mechanism for water distribution amongst local farmers. The principal water user associations within the Shasta Valley are the Grenada Irrigation District (GID), the Shasta River Water Association (SRWA), and the Montague Water Conservation District (MWCD). In addition, the smaller Big Springs Irrigation District (BSID) operates in the Shasta Valley. The following general descriptions identify the key characteristics on general water availability and pricing information for the major water districts in the Shasta Valley:[2]

1 Domestic water supply is not analyzed under this Draft Environmental Impact Report because the Program only addresses agricultural diversions and modifications to agricultural water supply systems. While there are public entities that supply water to local residences and businesses, these systems will not be modified or changed by the Program.

2 Comparisons of the delivered water prices between these districts are difficult because prices fluctuate with each district's annualized expenses for both capital improvements and its operations and maintenance costs (Webb, 2007).

Grenada Irrigation District. GID serves an approximately 1,600 acre area of farmland, of which approximately 700 acres are actively irrigated. This property tax-based district charges users on a per-acre basis. The majority of GID users are relatively far west of the mainstem Shasta River. Agricultural producers not currently being supplied water must pay a "stand-by" charge to help cover GID's fixed overhead cost of maintaining GID's infrastructure, such as pumps, ditches, and buildings. Agricultural producers receiving GID water deliveries pay "regular fees" that include the additional electricity charge for water pumping and delivery. The "stand-by" charge for GID agricultural producers is typically around $27/acre (in 2007 dollars), and "regular fees" for irrigation are approximately $149/acre (in 2007 dollars) (Webb, 2007).

Shasta River Water Association. SRWA is a farmers' cooperative that provides irrigation water to roughly 4,200 acres of farmland located on the west side of the Shasta River in the northern Shasta Valley. Each landowner who is a member of SRWA is entitled to a share of the available water, and is required to pay a portion of SRWA's annual overhead and delivery costs even if they do not take water for irrigation. The annual costs for members are generally between $50-$60/acre (Webb, 2007).

Montague Water Conservation District. MWCD provides water to approximately 13,000 acres of farmland located primarily in the area north of the Little Shasta River and east of the Shasta River, and also to the City of Montague. The MWCD's water is transferred from storage in Lake Shastina along more than 20 miles of primary irrigation supply canal. Additional deliveries are made to farmers located just north of Lake Shastina. Landowners within the district are entitled to a share of the available water at a baseline cost and when it is available can buy additional water at a higher cost. Water costs for MWCD can fluctuate greatly, with high water costs during drought years when MWCD's fixed operating costs must be covered by relatively small amounts of water sales (Webb, 2007).

Big Springs Irrigation District. BSID provides water to a maximum of 2,500 acres of farmland located in the vicinity of Big Springs, northeast of the Shasta River. In 2007, approximately 1,450 acres were actively irrigated. There are three tiers of rates based on a user's needs: active; ½ standby; and contract. The active ratepayer pays $5.65/irrigable acre. The ½ standby ratepayer does not receive water in a given year, but would be eligible to receive water the following year. The rate for this category is $2.83/irrigable acre. The contract ratepayer signs a contract that he will not need water from BSID for five years, and pays only $0.55/irrigable acre. Contract ratepayers must inform BSID two years in advance in order to be brought into rotation. The current cost of water is $19/acre-foot (Faris, 2007).

Sanitary Sewer

Within the unincorporated area of Siskiyou County, individual properties are serviced by on-site sewage disposal systems under permits issued by the Siskiyou County Public Health Department (Navarre, 2006). The Public Health Department follows a set of Sewage Disposal Codes that apply to all new construction, relocated buildings, and trailers and to all alterations, repairs, or reconstruction within the unincorporated area of the County (Siskiyou County, 2006).

Electricity and Natural Gas

Electrical service in the Program Area is provided by Pacific Power, a division of PacifiCorp. Siskiyou County does not have access to natural gas; however, several local companies provide propane to individual residences and businesses (Siskiyou County Economic Development Council, 2006).

Solid Waste and Recycling Service

The Yreka Solid Waste Landfill in Yreka provides refuse disposal and recycling services to residents and businesses in the Program Area. This landfill currently has a remaining permitted capacity of approximately 4.7 million cubic yards and is not projected to reach capacity until 2065 (CIWMB, 2006a).

3.7.2 Global Climate Change

The International Panel on Climate Change (IPCC) states that human activities contribute to climate change by causing changes in Earth's atmosphere in the amounts of greenhouse gases (GHGs), aerosols (small particles), and cloudiness (IPCC, 2007a). The largest known contribution comes from the burning of fossil fuels, which releases carbon dioxide gas to the atmosphere. GHGs and aerosols affect climate by altering incoming solar radiation and outgoing infrared (thermal) radiation that are part of Earth's energy balance. Changing the atmospheric abundance or properties of these gases and particles can lead to a warming or cooling of the climate system. Since the start of the industrial era (about 1750), the overall effect of human activities on climate has been a warming influence. The human impact on climate during this era greatly exceeds that due to known changes in natural processes, such as solar changes and volcanic eruptions (IPCC, 2007a).

Human activities result in emissions of four principal GHGs: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O) and the halocarbons (a group of gases containing fluorine, chlorine, and bromine). These gases are long-lived and accumulate in the atmosphere, causing concentrations to increase with time. Significant increases in all of these gases have occurred in the industrial era. All of these increases are attributable to human activities.

- Carbon dioxide has increased from fossil fuel use in transportation, building heating and cooling, and manufacturing. Deforestation releases CO_2 and reduces its uptake by plants. Carbon dioxide is also released in natural processes such as the decay of plant matter.

- Methane has increased as a result of human activities related to agriculture, natural gas distribution, and landfills. Methane is also released from natural processes that occur, for example, in wetlands. Methane concentrations are not currently increasing in the atmosphere because growth rates decreased over the last two decades, but current atmospheric levels are approximately three times higher than the pre-industrial period. Methane has an influence on climate ("global warming potential" or GWP) estimated to be 25 times that of CO_2 (IPCC, 2007a).

- Nitrous oxide is also emitted by human activities such as fertilizer use and fossil fuel burning. Natural processes in soils and the oceans also release N_2O. N_2O has a GWP 298 times that of CO_2 (IPCC, 2007a).

- Increases in halocarbon gas concentrations are primarily due to human activities, though natural processes are also a small source. Principal halocarbons include the chlorofluorocarbons (e.g., CFC-11 and CFC-12), which were used extensively as refrigeration agents and in other industrial processes before their presence in the atmosphere was found to cause stratospheric ozone depletion. The abundance of chlorofluorocarbon gases is decreasing as a result of international regulations designed to protect the ozone layer. These gases, however, have GWPs many hundreds or thousands of times that of CO_2. (IPCC, 2007a)

Some of the potential resulting effects in California of global warming may include loss in snow pack, sea level rise, more extreme heat days per year, more high ozone days, more large forest fires, and more drought years (CARB, 2006). Globally, climate change has the potential to impact numerous environmental resources through potential, though uncertain, impacts related to future air temperatures and precipitation patterns. The projected effects of global warming on weather and climate are likely to vary regionally, but are expected to include the following direct effects (IPCC, 2007b):

- Higher maximum temperatures and more hot days over nearly all land areas;

- Higher minimum temperatures, fewer cold days and frost days over nearly all land areas;

- Reduced diurnal temperature range over most land areas;

- Increase of heat index over land areas; and

- More intense precipitation events.

There are many secondary effects that are projected to result from global warming, including global rise in sea level, impacts to agriculture, changes in disease vectors, and changes in habitat and biodiversity. While the outcomes and the feedback mechanisms involved are not fully understood, and much research remains to be done, Global Climate Change has the potential to cause catastrophic environmental, social, and economic consequences.

The California Energy Commission (CEC) estimated that in 2004, California produced 492 million metric tons of CO_2-equivalent (mmt-eCO_2) GHG emissions (CEC, 2006). The CEC found that transportation is the source of 41 percent of the state's GHG emissions; followed by electricity generation at 22 percent; and industrial sources at 21 percent.

3.7.3 Regulatory Framework

State

Waste Management

Assembly Bill 939 (AB 939), enacted in 1989 and known as the Integrated Waste Management Act, required each city and/or county's Source Reduction and Recycling Element to reduce the amount of waste being disposed to landfills, with diversion goals of 50 percent by the year 2000. Siskiyou County has an adopted Countywide Source Reduction and Recycling Element that establishes goals and methods for compliance with AB 939. Siskiyou County's diversion rate in 2002 was 53 percent, which met the requirement of AB 939 (CIWMB, 2006b). The California Integrated Waste Management Board's Recycling Market Development Zone program helps the County meet this goal. This program includes the entire County and offers low-interest loans up to $1 million, technical assistance on financing strategies, and assistance with marketing nationally and internationally.

Global Climate Change

Concern about the disproportionately negative impacts global climate change is expected to have on the California environment and economy has led the state legislature to pass several climate change-related bills in the past five years. These bills aim to control and reduce the emission of GHGs in order to slow the effects of global climate change, and provide guidance as to determining the impact of individual projects on global climate change.

Assembly Bill 1493

Assembly Bill 1493 (AB 1493) was signed into law by the California Governor on July 22, 2002. This legislation required the California Air Resources Board (CARB) to adopt regulations, by January 1, 2005, that would result in the achievement of the "maximum feasible" reduction in GHG emissions from vehicles used in the state primarily for noncommercial personal transportation. As enacted, the AB 1493 regulations were to become effective January 1, 2006, and apply to passenger vehicles and light-duty trucks manufactured for the 2009 model year or later. AB 1493 prohibited CARB from requiring: (1) any additional tax on vehicles, fuel, or driving distance; (2) a ban on the sale of certain vehicle categories; (3) a reduction in vehicle weight; or (4) a limitation on or reduction of speed limits and vehicle miles traveled.

Although the regulation of tailpipe emissions traditionally is subject to the jurisdiction of the U.S. Environmental Protection Agency (USEPA), CARB has some regulatory authority due to the severe air quality issues in California. In fact, pursuant to the federal Clean Air Act, CARB may implement stricter regulations on automobile tailpipe emissions than the USEPA, provided a waiver from the USEPA is obtained.

In September 2004, CARB adopted AB 1493-mandated regulations and incorporated those standards into the Low-Emission Vehicle (LEV) program. The regulations set fleet-wide average GHG emission requirements for two vehicle categories: passenger car/light duty truck (type 1) and light-duty truck (type 2). The standards take into account the different GWPs of the several

GHGs emitted by motor vehicles, and would phase in during the 2009 through 2016 model years. If implemented, these regulations would produce a nearly 30 percent decrease in GHG emissions from light-duty vehicles by 2030.

In December 2004, these regulations were challenged in federal court by the Alliance of Automobile Manufacturers, who claimed that the regulations attempted to regulate vehicle fuel economy, a matter that lies within the exclusive jurisdiction of the federal government. In a decision rendered in December 2007, the U.S. District Court for the Eastern District of California rejected key elements of the automakers' challenge and concluded that CARB's regulations are neither precluded nor preempted by federal statutes and policy.

While the litigation described above was pending, in December 2005, CARB submitted a waiver application to the USEPA. After waiting nearly two years for a decision from the USEPA, in November 2007, California filed a lawsuit alleging that the USEPA failed to consider the waiver application in a timely fashion. The USEPA's chief promised to issue a decision on the application by December 31, 2007, and, in mid-December 2007, the USEPA's chief fulfilled his promise by issuing a decision denying California's waiver application. The denial was based on the assertion that new federal automobile fuel economy requirements achieve what California sought to accomplish *via* the AB 1493 regulations. The denial of California's waiver application has precluded as many as 16 other states from implementing tailpipe emission regulations similar to those adopted by California under AB 1493. In response to this denial, California filed a lawsuit, with the support of 15 other states, challenging the USEPA's decision.

Shortly after the USEPA issued its denial of California's waiver application, the Senate Environment and Public Works Committee and the House Oversight and Government Reform Committee (both led by Californians) made an official demand for all documents concerning the USEPA's decision to deny California's waiver application. (This request includes communications with the White House.) The USEPA has signaled that it would comply with this request for documents and any further Congressional investigation that follows.

Assembly Bill 32

Citing concerns similar to those enumerated in AB 1493, the California State Assembly also passed the California Global Warming Solutions Act of 2006 in August 2006. Also known as Assembly Bill 32 (AB 32), the law instructs CARB to set reporting requirements for GHG emissions and to devise rules and regulations that will achieve the maximum technologically feasible and cost-effective GHG emissions reduction, achieving a reduction in statewide GHG emissions to 1990 levels by 2020, and further reductions in future years.[3] While AB 32 sets out a timeline for the adoption of measures to evaluate and reduce GHG emissions across all source categories, it does not articulate these measures itself; instead, these measures will be determined in subsequent processes. The specific GHG emission reduction measures that will be required of facilities as result of the passage of AB 32 have not yet been set but currently are being devised.

[3] Prior to the enactment of AB 32, Governor Schwarzenegger signed Executive Order No. S-3-05 on June 1, 2005, mandating a reduction to 2000 levels by 2010, to 1990 levels by 2020, and to 80 percent below 1990 levels by 2050. Although the 2020 target is the core of AB 32, and has been incorporated into AB 32, the 2050 target remains the goal of the Executive Order only, as AB 32 does not speak to the 2050 target.

Under AB 32, by January 1, 2008, CARB was required to determine what statewide GHG emissions were in 1990 and set the 2020 limit equivalent to that level. In that regard, CARB determined that the 1990 GHG emissions level (and the 2020 statewide cap) was 427 million tonnes of eCO_2. Accordingly, the current estimate of reductions necessary to achieve AB 32's goal is 174 million tonnes of eCO_2. CARB staff estimates that the proposed discrete early action measures, discussed further below, will provide approximately 16 million tonnes of eCO_2 reductions, while the other early action measures will provide approximately 26 million tonnes of eCO_2 reductions. It is further anticipated that an additional 30 million tonnes of eCO_2 reductions will be secured through the passage of anti-idling measures and AB 1493. The remaining 102 million tonnes of eCO_2 needed to reduce California's GHG emissions to 1990 levels would be achieved through implementation of CARB's Scoping Plan and other regulatory efforts.

In addition, also by January 1, 2008, CARB was required to adopt mandatory GHG reporting and verification regulations. Accordingly, on December 6, 2007, CARB adopted regulations requiring the largest facilities in California to report their annual GHG emissions. These regulations require the facilities to begin tracking their GHG emissions in 2008, with reporting to be submitted in 2009. The facilities identified in the regulations account for 94 percent of California's emissions from industrial and commercial stationary sources, and the regulations cover approximately 800 separate sources (*e.g.*, electricity generating facilities and retail providers; oil refineries; hydrogen plants; cement plants; cogeneration facilities; and industrial sources that emit more than 25,000 tonnes of eCO_2 per year from an on-site stationary source).

CARB also has adopted its first set of GHG emission reduction measures, known as the "early action measures." At this time, CARB has approved 44 early action measures. These early action measures either are currently underway or are to be initiated by CARB in the 2007-2012 timeframe. A subset of these measures, known as "discrete early action measures," must be adopted by regulation by January 1, 2010, as required by AB 32. The early action measures cover a number of sectors including transportation, fuels, and agriculture.

Emission reduction measures that cannot be initiated in the 2007-2012 timeframe will be considered in the Scoping Plan. CARB issued a draft Scoping Plan in June, 2008 (CARB, 2008), which includes recommendations for the following emission reduction programs:

1. California Cap-and-Trade Program Linked to Western Climate Initiative
2. California Light-Duty Vehicle GHG Standards
3. Energy Efficiency
4. Renewables Portfolio Standard
5. Low Carbon Fuel Standard
6. High GWP Gases
7. Sustainable Forests
8. Water
9. Vehicle Efficiency Measures
10. Goods Movement
11. Heavy/Medium-Duty Vehicles
12. Million Solar Roofs Program
13. Local Government Actions and Regional Targets

14. High Speed Rail
15. Recycling and Waste
16. Agriculture
17. Energy Efficiency and Co-Benefits Audits for Large Industrial Sources

CARB accepted comments on the Draft Scoping Plan during the summer of 2008; AB 32 requires that CARB adopt the Scoping Plan before January 1, 2009. GHG emission limits and emission reduction measures from the Scoping Plan must be adopted by regulation on or before January 1, 2011, for enforcement by January 1, 2012. By January 1, 2014 and every five years thereafter, CARB will update its Scoping Plan.

AB 32 specifically allows CARB to consider a market-based compliance mechanism. A Market Advisory Committee (MAC) was formed under Governor Schwarzenegger's Executive Order No. S-20-06 in order to make recommendations to CARB on the design of a cap-and-trade mechanism for reducing GHG emissions. The MAC issued its final report in June 2007 to CARB for consideration. In general, the MAC proposed to include as many sources and sectors in the cap-and-trade program as practicable. The MAC also is recommending that emission allowances be auctioned rather than freely distributed. In addition, the MAC recommended that offsets be allowed to satisfy GHG limits and that linkages to other existing GHG markets be allowed. CARB currently is considering the recommendations of the MAC for inclusion into the Scoping Plan.

Senate Bill 97

With respect to CEQA, in 2007, the State Legislature passed Senate Bill 97 (SB 97), which addresses GHG analysis under CEQA. The bill exempts transportation projects funded under the Highway Safety, Traffic Reduction, Air Quality and Port Security Bond Act of 2006, and projects funded under the Disaster Preparedness and Flood Prevention Bond Act of 2006, from analysis of GHG emissions under CEQA. In addition, SB 97 requires the Office of Planning and Research, by July 1, 2009, to develop and transmit to the California Resources Agency guidelines for the mitigation of GHG emissions and their effects. The California Resources Agency will be required to adopt the regulations by January 1, 2010.

In addition to these bills, the California Legislature has introduced numerous other bills that range in scope from establishing market based compliance mechanisms to reduce GHG emissions to renewable energy standards for utilities in the state. It is unclear which, if any, of these bills eventually will be enacted.

Local

Siskiyou County General Plan

The Siskiyou County Conservation Element (1973) includes policies that assure adequate water supply and sewage disposal. The following Conservation Element objective related to water supply would be applicable to the Program:

- Preserve the quality of the existing water supply in Siskiyou County and adequately plan for the expansion and retention of valuable water supplies for future generations (Siskiyou County, 1973).

Greenhouse Gas Emissions

Siskiyou County does not have any rules or regulations that govern GHG emissions.

3.7.4 Impacts and Mitigation Measures

Significance Criteria

Based on Appendix G in the CEQA *Guidelines*, the Program may be deemed to have a significant adverse effect on the environment if it were to do any of the following:

a) Conflict with wastewater treatment requirements of the applicable Regional Water Quality Control Board;

b) Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects;

c) Require or result in the construction of new storm water drainage facilities, or expansion of existing facilities, the construction of which could cause significant environmental effects;

d) Require new or expanded water supply resources or entitlements;

e) Result in a determination by the wastewater treatment provider that would serve the project that it has inadequate capacity to serve the project's projected demand in addition to the provider's existing commitments;

f) Be served by a landfill with insufficient permitted capacity to accommodate the project's solid waste disposal needs;

g) Comply with federal, state, and local statutes and regulations related to solid waste.

Greenhouse Gases

Appendix G of the CEQA *Guidelines* sets forth "Air Quality" significance criteria used to evaluate project impacts, and states, "where available, the significance criteria established by the applicable air quality management or air pollution control district may be relied upon to make" a significance determination. However, Appendix G is written for criteria pollutants which are regulated by both an air quality management plan and numerous regulations and standards. GHGs are not criteria pollutants, and do not have resulting regulations or ambient air quality standards. As a result, the thresholds of significance set forth in Appendix G are not appropriate for use in analyzing the potential impacts of the Program on global climate change related to emissions of GHGs. Also, as discussed above in Section 3.7.2, no state or local agency has established significance thresholds for the analysis of GHG emissions under CEQA. Nonetheless, for

purposes of this Draft EIR, the following significance threshold has been created and utilized in assessing the impacts of the Program's GHG emissions on global climate change:

> The threshold will be determined by whether the Program's GHG emissions impede compliance with the GHG emissions reduction goals mandated in AB 32.

Effects Found Not to be Significant

The Initial Study for the Program (see Appendix D) found that potential impacts of the Program that relate to criteria *a-c* and *e-g* above would not be significant. Therefore, this Chapter only addresses impacts associated with criterion *d* (require new or expanded water supply resources or entitlements), as well as potential impacts on energy supply and emissions of GHGs.

Impact Analysis

Impact 3.7-1: The Program could result in the modification or expansion of existing water supply systems (Less than Significant).

The Program includes several minimization, avoidance, and mitigation measures that would involve changes to the existing systems of water diversion, conveyance, and application for irrigation and stock watering. These include: moving points of diversion; piping and lining ditches; realigning ditches; and removing barriers to fish passage. Several projects are specified, including the construction of a new diversion structure to replace the existing GID diversion. Construction of these and other projects could result in various impacts, which are evaluated in Chapters 3.2, 3.3, 3.4, 3.5, and 3.6.

Construction within stream channels is limited in the Program to the period of July 1-October 31. This overlaps with the diversion season. It is possible, therefore, that some water supply construction projects could interrupt service. Periods of service interruption are, however, likely to be temporary and of short duration, and are therefore considered less than significant.

Mitigation Measures

This potential impact was determined to be less than significant. No mitigation measures required.

Impact 3.7-2: Construction activities could inadvertently contact underground utility lines and/or facilities during excavation and other ground disturbance, possibly leading to short-term utility service interruptions (Less than Significant).

Some construction activities associated with Covered Activities would involve earth moving activities. In the course of such activities, underground utility lines could be encountered and damaged or disturbed, potentially interrupting services. Government Code, § 4216 requires pre-construction notification of the Underground Service Administration (USA) between two and 14 days before an underground activity that could disturb utility lines. Because of this requirement, the impact is considered less than significant.

Mitigation Measures

This potential impact was determined to be less than significant. No mitigation measures required.

Impact 3.7-3: Replacement of gravity-based surface water diversions with diversions or wells utilizing pumps, would increase power consumption and air emissions (Less than Significant).

Several of the Flow Enhancement Mitigation Measures contained in the Program's proposed Incidental Take Permit (ITP) involve changes in surface water diversions, including moving points of diversion downstream closer to the point of use, and switching from surface water diversions to groundwater pumping for fall stock watering. Most existing surface water diversions are gravity-based and do not use electric or fuel-powered pumps. The Flow Enhancement Mitigation Measures would in some instances substitute electric or fuel-powered pumps for existing gravity-based systems, either to lift surface water to an irrigation ditch or to the point of use, or to pump groundwater. This would result in increased demand for electric power and fuel.

The number of diversions that would be affected, their location, and the types and sizes of pumps involved in fulfilling the requirements of the Flow Enhancement Mitigation Measures is unknown. For the purposes of this analysis, it was assumed that at the peak of the diversion season up to 230 cfs would be pumped instead of gravity-diverted, and that half of this would be with electric pumps and half with fuel-powered pumps (assuming that electric pumps would be used where possible). As a worst-case scenario, it was assumed that all fuel-powered pumps would use diesel fuel, and that all electrical pumps would be powered from the electrical grid. It was further assumed that the average vertical lift for all pumps would be 30 feet, and that there would be 50 individual pumped diversions. Ten of the pumped diversions would be larger, with a capacity of 15 cfs each, and 40 would be smaller, with a capacity of 2 cfs each.

Based on a rough estimate that five horsepower is required to lift 1 cfs 30 vertical feet, pumping requirements could be met with a combination of 20 ten-horsepower electric pumps and five 75-horsepower electric pumps, and the same number and size of diesel-powered pumps. Using a standard conversion for horsepower to electrical power consumption, the total power requirement for the electrical pumps would be about 429 kilowatts (kW), or 10,295 kilowatt hours per day (kWH/d) if they were operated 24 hours. These figures are shown in **Table 3.7-1**. Table 3.7-1 also shows the estimated emissions of criteria air pollutants from anticipated diesel pump operation. The table indicates that total emissions of criteria air pollutants would fall well below the significance thresholds set by the Siskiyou County Air Pollution Control District (SCAPCD) (see the Air Quality analysis in Appendix D, Initial Study).

According to PacifiCorp, which supplies electricity to the Shasta Valley, there is sufficient transmission capacity to supply the anticipated additional electrical power demand that the Program may create (Chambers, 2007). Some areas of the Shasta Valley have limited

TABLE 3.7-1
POWER CONSUMPTION AND EMISSIONS FROM PUMPS

Diesel Pumps		Quantity of Equip	Program Specific Equipment HP	State Average HP	Equipment Usage - Program	
Equipment	**Fuel**				**Hours/ day**	**Days/year**
Small Diesel Pumps (2 cfs each)	diesel	20	10	10	24	198
Large Diesel Pumps (15 cfs)	diesel	5	75	70	24	198

Diesel Pump Emissions	Equipment Emissions (lbs/day) - Based on OFFROAD 2007 Emissions Model					
	ROG	**CO**	**NOx**	**CO_2**	**SO_2**	**PM-10**
Small Diesel Pumps	7.8	26.3	45	3,560	0.1	3.4
Large Diesel Pumps	20.8	67.2	130	10,013	0.1	10.3
TOTAL - lbs/day	28.6	93.5	175	13,573	0.2	13.7
TOTAL Tons per Year*	2.8	9.3	17.3	1,219	0.02	1.4
Siskiyou Co. Air Pollution Control District Threshold (short tons/year)	40	100	40	NA	40	15

* CO2 figure is metric tons per year; others are short tons per year.

Electric Pumps: CO2 Emissions	Value	Unit
1cfs, 30 ft head to Horsepower	5	hp
Total Volume Pumped	115	cfs
Horsepower requirement	575	hp
Horsepower to kW	429	kW
Energy Consumption, 24 hours	10,295	kWH/day
Energy Consumption, Annual (198 days)	2,038,370	kWH
$C0_2$ Emission factor	0.00036551	Mg/kWH
Annual CO_2 Emissions	745	Mg
Project Lifecycle CO_2 Emissions (10 years)	7,450	Mg

Key:
ROG: reactive organic compounds
CO: carbon monoxide
Nox: oxides of nitrogen
CO_2: carbon dioxide
SO_2: sulfur dioxide
PM-10: Particulate matter less than 10 microns
hp: horsepower
cfs: cubic feet per second
kW: kilowatt
kWH: kilowatt hour
Mg: million grams (1 million grams = 1 metric ton)

Notes:
1 horsepower hour = 0.745 699 861 kilowatt hour (from onlineconversion.com)
CO_2 emissions for electricity generation for California calculated from factors in CA Climate Action Registry, 2007

SOURCE: Chambers, 2007; ESA

transmission capacity that may limit the ability to use larger pumps; this would have to be assessed on a case-by-case basis.

Because sufficient electrical transmission capacity exists to supply the anticipated increase in demand, and because the potential for increased emissions of criteria air pollutants falls below SCAPCD thresholds, this impact is considered less than significant.

Mitigation Measures

This potential impact was determined to be less than significant. No mitigation measures required.

Impact 3.7-4: Construction activities and water pumping associated with Covered Activities and ITP mitigation measures would generate greenhouse gas emissions, which would make a contribution to global warming (Less than Significant).

Projects associated with some of the Program's Covered Activities would generate GHG emissions in the form of CO_2. Small amounts of other GHGs could also be emitted. GHG emissions would be generated by construction activities and by water diversions that would use diesel or electric powered pumps.

Most existing diversions are gravity-based and do not use other power sources. As described in Chapter 2, Project Description, ITP Flow Enhancement Mitigations 2 and 4 (ITP Article XIII.E.2(a)(ii) and (iv)) would in some instances use electric or fuel-powered pumps in place of existing gravity-based systems, either to lift surface water to an irrigation ditch further downstream from the existing point of diversion, or directly to the point of use; pumps would also be used to pump groundwater for alternative stock watering systems, and to pressurize more water-conserving irrigation systems.

Several of the Covered Activities in the ITP and the Master List of Terms and Conditions (MLTC) involve construction activities, including instream and riparian restoration activities, and construction and installation of headgates, boulder weirs, fish screens, and measuring devices. Similar activities already occur on an annual basis, but because the Program specifically includes certain construction activities, and would likely result in other activities such as the installation and operation of pumps that would emit GHGs, these activities and their related emissions are considered to be part of the Program.

Estimated GHG emissions that would be generated with implementation of the Program are presented in **Table 3.7-2**, and are estimated to be approximately 2,358 metric tons per year of eCO_2. Over the ten-year span of the Program, emissions are expected to be 23,577 metric tons of eCO_2.

Other aspects of the Program would result in reduction of GHG emissions or emission offsets. Water efficiency measures required by the Program (see Project Description, Chapter 2) would

TABLE 3.7-2
ESTIMATED GREENHOUSE GAS EMISSIONS
FIGURES ARE MILLIONS OF GRAMS (METRIC TONS) OF CARBON DIOXIDE EQUIVALENT

Activity and Equipment	Annual Emissions Mg eCO_2	Program Lifecycle Emissions[a] Mg eCO_2
Emission Sources		
Construction Equipment Emissions	154	1,535
Vehicle Emissions	240	2,402
Pump Emissions: Diesel	1,219	12,190
Pump Emissions: Electric	745	7,450
Subtotal: Emission Sources	**2,358**	**23,577**
Emission Reductions and Off-Sets		
Riparian Revegetation and Fencing	-984	-24,589
Water Use Efficiency (15% Reduction in pump emissions)	-295	-2,946
Subtotal: Program Reductions and Off-Sets	**-1,279**	**-27,535**
Net Greenhouse Gas Emissions of Program	**1,079**	-3,958
Optional Mitigation Measures		
Use of renewable energy for pumping (10% of pumping)[b]	-167	-1,669
Use of Biodiesel Blend[c]	-197	-1,965
Subtotal: Optional Mitigation Measures	**-393**	**-3,929**
Net Greenhouse Gas Emissions with Optional Measures	**686**	**-7,887**

[a] Program lifecycle emissions are based on a ten-year period, except for riparian revegetation and fencing, which is based on 25 years of forest growth.
[b] 15 percent water use efficiency factored into this emission reduction calculation.
[c] Emission reduction calculation for biodiesel based on use of 20 percent biodiesel blend for all construction equipment and diesel-powered pumps, and half of vehicle emissions; 15 percent water efficiency also factored into emission reduction from pumps.

reduce the need for pumping by an estimated 10 to 20 percent. Therefore, a 15 percent reduction in pump emissions has been applied to the emissions presented in Table 3.7-2.

Two aspects of the Program are intended to result in plantings along portions of the Shasta River's riparian corridor. These are ITP Mitigation Obligation E.2.b.iii (Article XIII), which requires the SVRCD to plant eight linear miles of riparian forest over the ten-year term of the ITP; and Additional Avoidance and Minimization Measure E (Article XV), which requires SVRCD and sub-permittees to prepare a Riparian Fencing Plan and submit it to CDFG for approval within one year of the effective date of the Program; and in each of the successive nine years to install an average of two miles of exclusionary fencing in areas identified in a priority list that will be developed as part of the plan. Fencing would be approximately 35 feet from the edge of the streambank. Sub-permittees would be required to make reasonable efforts to include the existing riparian vegetation within the fenced area.

As plants grow, they use CO_2 in the process of photosynthesis and store carbon in their cell walls. As a forest matures, a considerable volume of carbon is accumulated and stored in standing live and dead trees, understory vegetation, downed dead wood, litter on the forest floor, and in the soil. The accumulation, or sequestration, of carbon in forests is recognized as an important mechanism for reducing the concentration of CO_2 in the atmosphere, and is an essential tool in combating global warming (Nabuurs et al, 2007).

The U.S. Department of Agriculture has developed methods for estimating carbon sequestration in forests in the United States, as part of the Department of Energy's Voluntary Reporting of Greenhouse Gases Program, also known as the 1605(b) Program (USDA, 2007). The simplest of these methods uses "look-up tables" in which the average amount of carbon in a forest stand (referred to as "carbon stock") is given for different regional forest types in the years following a clearcut. This method was used for estimating the amount of carbon that can be expected to be sequestered in the riparian forest areas that will be revegetated and protected under the Program.[4] The results for carbon sequestration are shown as the total amount of carbon, expressed both as carbon contained in plant matter, and its CO_2 equivalent, that would accumulate during the 25 years following revegetation and fencing. 24,589 metric tons of CO_2 equivalent can be expected to be sequestered due to the reforestation activities associated with the Program (**Table 3.7-3**).

Table 3.7-2 indicates that over the ten-year life of the ITP, Program activities will result in the emission of 23,577 tons of CO_2. Table 3.7-2 also shows that water conservation and reforestation measures that are part of the Program will result in reduction and offset of over 27,500 tons of CO_2 equivalent. As a result, the Program is expected to result in a net decrease in GHG emissions over the life of the Program, and so will not impede compliance with the GHG emissions reduction goals mandated in AB 32. Therefore, any potential impact the Program will have on global climate change is considered less than significant.

Mitigation Measures

This potential impact was determined to be less than significant. No mitigation measures required.

Additional Mitigation Measures Identified in This Draft EIR

The mitigation measures discussed below were identified as part of this Draft EIR. While these measures are not required to reduce this impact to less than significant, they are technically feasible. Still, CDFG does not have the statutory or regulatory authority to impose these requirements. As a result, they will only be implemented voluntarily or by another regulatory agency (e.g., CARB) that has the authority to require them, whether now or in the future.

[4] Table A-21 from USDA, 2007 provides estimates of carbon stock of alder-maple stands on forest land after clearcut harvest in the Pacific Northwest, western area. For the analysis, it was assumed that areas that would be revegetated under the Program would have a carbon stock equivalent to a recently clearcut forest, except that carbon stored in down dead wood would be less. For areas that would be fenced, it was assumed that the carbon stock at the time of fencing would be equivalent to a forest 15 years after clearcut.

TABLE 3.7-3
CARBON SEQUESTRATION FROM REFORESTATION

Program Element	Description	Assumed Carbon Stock at Beginning of Program[1,2] (Mg per Acre)	Assumed Carbon Stock 25 years after beginning of Program[1] (Mg per Acre)	Increase in Carbon Stock (Mg per Acre)	Area Affected (Acres)	Lifecycle Increase in Carbon Stock (Mg)	Carbon Dioxide Equivalent (Mg)
SVRCD Mitigation Obligation b.iii	Riparian forest planting (8 linear miles; assume 35 foot width)	9.4	53.4	44.1	34	1,498	5,497
Additional Minimization and Avoidance Measure E	Install 2 miles per year (years 2-10) riparian fencing 35 feet from channel	22.1	90.6	68.5	76	5,202	19,092
TOTAL					110	6,700	24,589

Key:
Mg = million grams, or metric tons

Notes:
1 Values for carbon stock from USDA, 2007, look-up table A21 for Alder-Maple forest stands in the Pacific Northwest, West region.
2 For areas targeted for planting, assumes no standing vegetation at beginning of program. Look-up table value adjusted to account for assumed lower amount of down deadwood; for areas targeted for fencing assumes forest stand is equivalent to 15 years after clearcut.

SOURCE: CDFG, USDA, 2007, ESA

Mitigation Measure 3.7-4a: Program participants are encouraged to fuel all diesel equipment, including pumps, vehicles, and construction equipment, with a minimum 20 percent biodiesel (maximum 80 percent conventional diesel) blend (B-20). B-20 biodiesel is currently available commercially in Siskiyou County.[5] A blend of 20 percent biodiesel will reduce CO_2 emissions by approximately 15 percent (USDOE, 2005), although with a slight increase in NOx (the increase in NOx emissions would not exceed significance thresholds established by SQAPCD – see the emissions calculations in the technical appendix to the Initial Study in Appendix D).

Mitigation Measure 3.7-4b: Renewable energy sources such as photovoltaic or wind power could be used to power some pumps installed to meet Program requirements for stock watering and moving points of diversion downstream.

Table 3.7-2 shows the reduction in emissions achieved by using renewable energy sources for 10 percent of the projected increase in pumping due to the Program.

References

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